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UNITED STATES NAVAL OBSERVATORY

CIRCULAR NO. 53

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ANNULAR ECLIPSES IN 1958, 1959

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At the request of Commission 13 of the International Astronomical Union, the office of the American Ephemeris agreed to publish advance information on solar eclipses, computed from tabular positions of the Sun and Moon prepared for the purpose in the British Nautical Almanac Office. The tracks of total solar eclipses until 1960, annular and partial solar eclipses until 1957, have already been published in U. S. Naval Observatory Circulars Nos. 1, 2, 16, and 40.

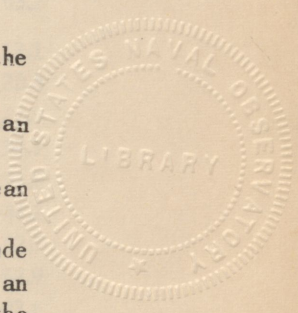
The present circular gives the result of the definitive calculations for the annular eclipses of 1958 and 1959. There will be no partial eclipse of the sun in 1958 and 1959.

The following corrections have been applied to the tabular positions of the Sun and Moon:

for 1958: $+1''.40$ to the Sun's mean longitude, $-3''.00$ to the Moon's mean longitude, $-0''.50$ to the Moon's latitude.

for 1959: $+1''.40$ to the Sun's mean longitude, $-4''.00$ to the Moon's mean longitude, $-0''.50$ to the Moon's latitude.

The effect of a subsequent additional correction to the Moon's mean longitude on the position of the eclipse track may be closely determined as follows: for an additional positive correction of k seconds of arc, lay off from any point on the track a distance of $27k$ seconds of arc in longitude, eastward along the same parallel of latitude.



ANNULAR ECLIPSE OF 1958 APRIL 19

Universal Time		Northern Limit		Central Line		Southern Limit		Duration of Annular Phase on Central Line							
		Latitude	Longitude from Greenwich	Latitude	Longitude from Greenwich	Latitude	Longitude from Greenwich								
h	m	°	'	°	'	°	'	°	'	m	s				
(Limits)	+	2	07	-	65 56	+	0 50	-	66 25	-	0 26	-	66 54	. . .	
1	35	3	36.5	72	52.4	3	04.6	76	06.5	+	2	26.1	78	36.6	5 12.9
	40	6	08.5	81	53.6	5	22.2	83	38.0	4	35.5	85	14.1	5 27.0	
	45	7	52.9	86	52.2	7	04.4	88	16.3	6	16.0	89	36.0	5 37.3	
	50	9	21.6	90	34.9	8	32.4	91	48.9	7	43.4	92	59.8	5 46.1	
	55	10	41.5	93	37.0	9	52.0	94	44.5	9	02.9	95	49.8	5 53.9	
2	00	+	11 55.4	-	96 13.0	+	11 05.8	-	97 16.0	+	10 16.7	-	98 17.0	6 01.1	
	05		13 04.9		98 30.8		12 15.3		99 30.3		11 26.3		100 28.1	6 07.8	
	10		14 11.0		100 35.1		13 21.4		101 31.7		12 32.3		102 27.0	6 14.0	
	15		15 14.2		102 29.0		14 24.6		103 23.3		13 35.5		104 16.3	6 19.9	
	20		16 15.0		104 14.9		15 25.4		105 07.2		14 36.3		105 58.3	6 25.4	
	25		17 13.8		105 54.4		16 24.1		106 44.9		15 34.9		107 34.3	6 30.6	
	30		18 10.7		107 28.8		17 20.9		108 17.6		16 31.6		109 05.5	6 35.5	
	35		19 06.0		108 59.1		18 16.0		109 46.3		17 26.6		110 32.8	6 40.1	
	40		19 59.8		110 26.1		19 09.6		111 11.9		18 20.0		111 57.0	6 44.3	
	45		20 52.2		111 50.5		20 01.8		112 35.0		19 11.9		113 18.7	6 48.2	
	50		21 43.2		113 12.9		20 52.6		113 56.1		20 02.4		114 38.5	6 51.8	
	55		22 33.1		114 33.9		21 42.1		115 15.8		20 51.6		115 57.0	6 55.0	
3	00	+	23 21.8	-	115 53.9	+	22 30.4	-	116 34.5	+	21 39.6	-	117 14.5	6 57.9	
	05		24 09.4		117 13.3		23 17.6		117 52.6		22 26.3		118 31.4	7 00.4	
	10		24 55.9		118 32.6		24 03.6		119 10.6		23 11.8		119 48.1	7 02.5	
	15		25 41.3		119 52.1		24 48.5		120 28.8		23 56.1		121 04.9	7 04.3	
	20		26 25.6		121 12.2		25 32.3		121 47.5		24 39.3		122 22.3	7 05.7	
	25		27 08.9		122 33.2		26 14.9		123 07.0		25 21.4		123 40.4	7 06.6	
	30		27 51.1		123 55.4		26 56.5		124 27.8		26 02.3		124 59.7	7 07.1	
	35		28 32.2		125 19.3		27 36.9		125 50.1		26 42.0		126 20.5	7 07.2	
	40		29 12.2		126 45.2		28 16.1		127 14.2		27 20.5		127 43.0	7 06.8	
	45		29 51.0		128 13.4		28 54.2		128 40.6		27 57.8		129 07.6	7 06.0	
	50		30 28.6		129 44.3		29 31.0		130 09.6		28 33.9		130 34.8	7 04.7	
	55		31 04.9		131 18.4		30 06.5		131 41.7		29 08.6		132 04.8	7 02.9	
4	00	+	31 39.9	-	132 56.2	+	30 40.7	-	133 17.2	+	29 41.9	-	133 38.1	7 00.6	
	05		32 13.5		134 38.0		31 13.4		134 56.6		30 13.8		135 15.2	6 57.9	
	10		32 45.6		136 24.6		31 44.6		136 40.5		30 44.1		136 56.5	6 54.6	
	15		33 16.0		138 16.5		32 14.1		138 29.4		31 12.8		138 42.6	6 50.9	
	20		33 44.6		140 14.4		32 41.8		140 24.1		31 39.6		140 34.4	6 46.8	
	25		34 11.2		142 19.2		33 07.5		142 25.5		32 04.4		142 32.4	6 42.1	
	30		34 35.5		144 32.1		33 31.0		144 34.4		32 27.1		144 37.6	6 36.9	
	35		34 57.4		146 54.2		33 52.0		146 52.2		32 47.3		146 51.2	6 31.3	
	40		35 16.3		149 27.3		34 10.2		149 20.3		33 04.7		149 14.7	6 25.1	
	45		35 32.0		152 13.5		34 25.1		152 00.8		33 18.9		151 49.9	6 18.5	
	50		35 43.6		155 15.8		34 36.1		154 56.4		33 29.2		154 39.4	6 11.3	
	55	+	35 50.3	-	158 38.3	+	34 42.3	-	158 11.0	+	33 35.0	-	157 46.7	6 03.5	

ANNULAR ECLIPSE OF 1958 APRIL 19 (Continued)

h - m	° /	° /	° /	° /	° /	° /	m s
5 00	+ 35 50.6	- 162 27.7	+ 34 42.5	- 161 50.4	+ 33 35.0	- 161 17.1	5 55.1
05	35 42.3	166 55.1	34 34.5	166 04.6	33 27.2	165 19.5	5 45.8
10	35 20.8	172 23.0	34 14.4	171 12.4	33 08.1	170 10.0	5 35.3
15	34 33.6	- 179 52.9	33 32.3	- 178 01.6	32 29.7	- 176 27.0	5 22.7
20			31 24.8	+ 168 11.5	30 56.4	+ 172 57.9	5 01.6
(Limits)	+ 31 49	+ 163 05	+ 30 33	+ 163 40.	+ 29 19	+ 164 14	

In the eclipse of 1958 April 19, geocentric conjunction will occur at $19^{\text{h}} 03^{\text{m}} 35^{\text{s}} 26^{\text{s}}.9$ in right ascension $1^{\text{h}} 46^{\text{m}} 13^{\text{s}}.72$, the declination of the Sun being $+10^{\circ} 58' 17''.9$. West longitudes are positive.

ANNULAR ECLIPSE OF 1959 APRIL 8

Universal Time	Northern Limit		Central Line		Southern Limit		Duration of Annular Phase on Central Line
	Latitude	Longitude from Greenwich	Latitude	Longitude from Greenwich	Latitude	Longitude from Greenwich	
h m	° /	° /	° /	° /	° /	° /	m s
(Limits)	- 42 15	- 72 24	- 43 36	- 72 25	- 44 58	- 72 27	
1 40	40 15.2	85 26.4	42 08.5	82 19.2			5 23.2
45	38 09.5	94 48.2	39 41.5	93 50.3	41 19.1	92 33.7	5 41.0
50	36 31.2	100 35.8	37 55.5	100 10.2	39 23.5	99 36.3	5 53.1
55	35 04.8	104 58.3	36 24.2	104 49.2	37 46.4	104 35.1	6 03.2
2 00	- 33 45.8	- 108 32.2	- 35 01.5	- 108 33.2	- 36 19.5	- 108 31.0	6 12.1
05	32 32.1	111 33.8	33 44.8	111 41.8	34 59.5	111 47.7	6 20.3
10	31 22.4	114 12.3	32 32.7	114 25.4	33 44.7	114 37.0	6 27.8
15	30 16.0	116 33.2	31 24.2	116 50.3	32 34.0	117 06.3	6 34.7
20	29 12.4	118 40.6	30 18.8	119 00.8	31 26.7	119 20.2	6 41.2
25	28 11.1	120 37.1	29 16.0	120 59.8	30 22.3	121 21.8	6 47.2
30	27 12.0	122 24.7	28 15.5	122 49.4	29 20.4	123 13.7	6 52.7
35	26 14.7	124 04.9	27 17.1	124 31.4	28 20.8	124 57.5	6 57.9
40	25 19.1	125 39.1	26 20.5	126 07.1	27 23.2	126 34.8	7 02.6
45	24 25.0	127 08.3	25 25.6	127 37.5	26 27.4	128 06.5	7 06.9
50	23 32.4	128 33.3	24 32.2	129 03.5	25 33.3	129 33.7	7 10.8
55	22 41.1	129 54.8	23 40.3	130 26.0	24 40.8	130 57.2	7 14.3
3 00	- 21 51.0	- 131 13.5	- 22 49.8	- 131 45.5	- 23 49.7	- 132 17.5	7 17.3
05	21 02.1	132 29.8	22 00.5	133 02.5	23 00.0	133 35.4	7 19.9
10	20 14.4	133 44.3	21 12.5	134 17.7	22 11.7	134 51.3	7 22.1
15	19 27.7	134 57.4	20 25.6	135 31.5	21 24.6	136 05.7	7 23.8
20	18 42.1	136 09.6	19 39.9	136 44.2	20 38.8	137 19.1	7 25.0
25	- 17 57.5	- 137 21.2	- 18 55.3	- 137 56.4	- 19 54.2	- 138 31.9	7 25.7

ANNULAR ECLIPSE OF 1959 APRIL 8 (Continued)

h	m	°	'	°	'	°	'	°	'	°	'	m	s
3	30	- 17	13.9	- 138	32.7	- 18	11.7	- 139	08.4	- 19	10.7	- 139	44.5
	35	16	31.3	139	44.4	17	29.2	140	20.6	18	28.3	140	57.2
	40	15	49.7	140	56.6	16	47.8	141	33.4	17	47.1	142	10.6
	45	15	09.0	142	09.9	16	07.5	142	47.2	17	07.0	143	25.0
	50	14	29.3	143	24.6	15	28.2	144	02.5	16	28.1	144	40.8
	55	13	50.7	144	41.2	14	50.0	145	19.6	15	50.4	145	58.6
4	00	- 13	13.1	- 146	00.2	- 14	12.9	- 146	39.2	- 15	13.8	- 147	18.8
	05	12	36.6	147	22.0	13	36.9	148	01.7	14	38.4	148	42.0
	10	12	01.2	148	47.4	13	02.2	149	27.8	14	04.3	150	09.0
	15	11	27.0	150	17.1	12	28.7	150	58.3	13	31.6	151	40.5
	20	10	54.1	151	51.9	11	56.6	152	34.2	13	00.4	153	17.5
	25	10	22.6	153	32.9	11	26.1	154	16.5	12	30.8	155	01.2
	30	9	52.7	155	21.6	10	57.2	156	06.6	12	02.9	156	53.0
	35	9	24.5	157	19.7	10	30.2	158	06.6	11	37.1	158	55.2
	40	8	58.4	159	29.7	10	05.4	160	19.0	11	13.7	161	10.4
	45	8	34.8	161	55.0	9	43.3	162	47.7	10	53.3	163	43.0
	50	8	14.4	164	41.1	9	24.7	165	38.7	10	36.7	166	39.7
	55	7	58.2	167	57.2	9	11.0	169	02.4	10	25.6	170	12.6
5	00	- 7	48.5	- 172	01.3	- 9	04.7	- 173	20.5	- 10	23.5	- 174	48.5
	05	7	51.0	- 177	41.7	9	14.1	- 179	38.1	10	42.7	+ 177	57.4
(Limits)		- 8	58	+ 167	59	- 10	21	+ 167	52	- 11	45	+ 167	45

In the eclipse of 1959 April 8, geocentric conjunction will occur at $8^{\text{d}} 03^{\text{h}} 07^{\text{m}} 29^{\text{s}}.2$ in right ascension $1^{\text{h}} 04^{\text{m}} 42^{\text{s}}.22$, the declination of the Sun being $+6^{\circ} 53' 16''.4$. West longitudes are positive.

ERRATA

In Circular No. 16, page 2, column 4, the Duration on the Central Line should read:

U.T. Duration			U.T. Duration			U.T. Duration			U.T. Duration		
h	m	s	h	m	s	h	m	s	h	m	s
19	20	167	20	10	280	21	00	311	21	50	269
	25	187		15	286		05	310		55	261
	30	203		20	292		10	308	22	00	252
	35	216		25	297		15	306		05	241
	40	228		30	301		20	303		10	230
	45	239		35	304		25	299		15	218
	50	249		40	307		30	295		20	204
	55	258		45	309		35	289		25	188
20	00	266		50	310		40	283		30	166
	05	273		55	311		45	277			